

大葉大學九十學年度研究所碩士班招生考試試題紙

系 所 組 別	考 試 科 目 (中 文 名 稱)	考 試 日 期	備 註
電機工程所 甲組	電磁學	4 月 22 日 第 3 節	共 2 頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

- 1.) Please write down the differential form and integral form of Maxwell's equations. (15%)
- 2.) The space between two concentric spheres of radii a and b ($a < b$) in free space is charged to a volume charge density given by $\rho(r) = \frac{K}{r^2}$; $a < r < b$, where K is a constant. (a) Find the total charge in the shell. (b) Find the electric field at all points in space. (c) Find the electric potential at all points in space. (15%)
- 3.) A parallel-plate capacitor of cross sectional area A and thickness d is filled with a dielectric material whose relative permittivity varies linearly from $\epsilon_r = 1$ at one plate to $\epsilon_r = 10$ at the other plate. Find the capacitance. (20%)
- 4.) Determine the mutual inductance between a very long straight wire and a conducting equilateral triangular loop, as shown in Fig. P-4. (15%)
- 5.) For the cascaded transmission circuit as shown in Fig. P-5, please use the bounce diagram to sketch the load voltage $V_L(t)$ over time interval $0 \leq t \leq 5\text{ns}$. (20%)
- 6.) A signal generator is to feed equal power through a lossless transmission line with a characteristic impedance $50\ \Omega$ to two separate resistive loads, $64\ \Omega$ and $25\ \Omega$ respectively. Quarter-wave transformers are used to match the loads to the $50\ \Omega$ line, as shown in Fig. P-6. Please determine the required characteristic impedances of the two quarter-wave lines. (15%)

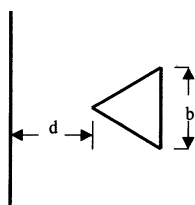


Fig. P- 4

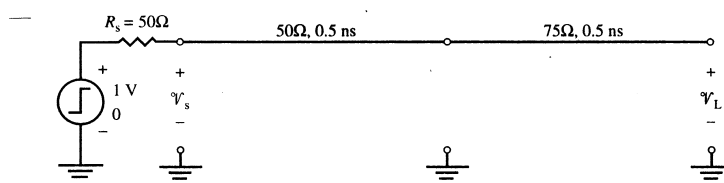


Fig. P- 5

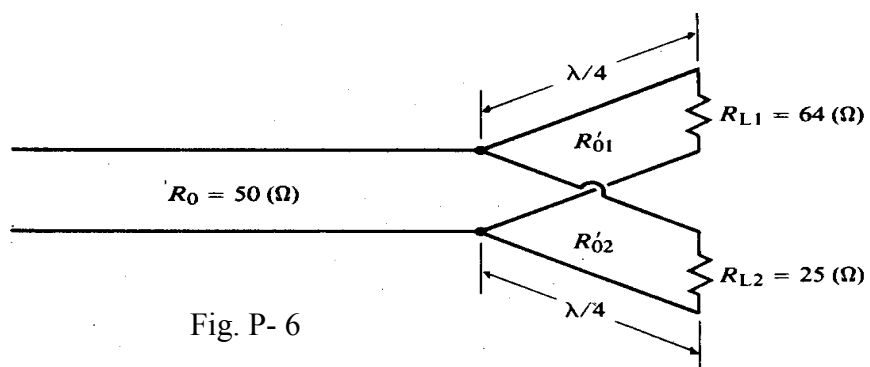


Fig. P- 6

本文件僅供參考